CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternatives

2.1.1. Alternative 1 – Construct Transmission Line

TVA would construct a new 161-kV transmission line to serve a new substation being built at Bingham by MTEMC. The new line would connect into the TVA system at one of four points: TVA's Davidson, Tennessee, 500-kV Substation; MTEMC's Aspen Grove 161-kV Substation; a tap connection to TVA's Maury-Radnor 161-kV Transmission Line; and a tap connection to TVA's Davidson-Centerville 161-kV Transmission Line. This option would meet the need to relieve overloading and reliability concerns in the Bingham area and, depending on the connection point selection and line routing, provide an opportunity to serve additional projected load increases in western Williamson County. This alternative would require the purchase and clearing of new transmission line right-of-way for a distance ranging from approximately 8 to 16 miles depending on the final route option.

2.1.2. Alternative 2 – Distribution System Upgrades

MTEMC would increase the transformer capacity at its existing substations that serve the western part of Williamson County and would build at least five additional lower voltage circuits from these substations into the Bingham area. These lines would be built on new rights-of-way wherever available, typically 40 feet in width, to achieve system reliability. The mileage required is estimated to be between 45 to 50 miles. The large number of line miles at lower voltages would result in a less efficient system of supplying electricity to western Williamson County than would Alternative 1, with more energy lost in line losses, i.e., conductor heating. This alternative would cost almost twice as much as Alternative 1. This alternative was rejected as TVA's preferred alternative and was considered unreasonable in light of the less impactive and less costly Alternative 1.

2.1.3. Alternative 3 - Load Reduction and/or Conservation

MTEMC and TVA have estimated that the Bingham service area system needs will be 62.1 megawatts (MW) above firm capability in 2004. TVA currently operates an energy conservation program, which TVA and the distributors cooperatively promote and expand. Energy efficiency initiatives throughout the MTEMC service area have resulted in a 21.1 MW reduction from October 1998 through December 2002. These initiatives include *energy right*® installations, the Direct Load Control (DLC) Program and In Concert With The Environment (Appendix III).

Due to the rapid growth in electricity demand and the planned increases for new homes in the Bingham area, it does not appear that current conservation efforts would be sufficient to offset the projected 2004 deficit. At the current rate of implementation, existing programs could lower the anticipated deficit by approximately 9 MW across the entire 2000 square-mile service area, of which the Bingham area represents 5 percent.

It is unlikely that development and implementation of any additional conservation efforts would be possible in a time frame that would meet the identified system need. This

assumption is based on the findings of a 2002 study of demand-side management options for the Tennessee Valley. This study explored energy efficiency program options that could supply electricity savings within 2 years. This study indicated a potential load reduction of 3.4 average MW and 6.7 peak MW across the entire MTEMC service area (Appendix III).

The combination of existing and proposed efficiency programs could result in a peak load reduction of 15.7 MW in the MTEMC service area through 2004. Prorating these conservation efforts to the Bingham area using square miles of area served as the basis, the resulting load reduction would be less than 1 MW. This reduction would leave a Bingham area system deficit of 61 MW. Based on this 61-MW deficit, conservation was determined not to be a reasonable alternative for meeting the needs of the Bingham area during this time frame.

2.1.4. Alternative 4 – The No Action Alternative

Taking no action would result in an overloading of the MTEMC system in western Williamson County. The increasing load due to ongoing and already planned development could not be met and system outages, especially at times of high electricity use, would occur. The alternative of taking no action would not meet the identified needs and was rejected as unreasonable.

2.2. Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line

2.2.1. Transmission Line Construction

2.2.1.1. Structures and Conductors

The proposed transmission line would primarily use single-steel poles. Their heights vary according to the terrain and would average between 80 to 90 feet. Three conductors (the cables that carry the electrical current) are required to make up a circuit in alternating current transmission lines. For 161-kV transmission lines, each conductor is made up of a single cable. The conductors are attached to fiberglass or ceramic insulators suspended from the structure crossarm. A smaller overhead ground wire is attached to the top of the structures. This ground wire may contain fiber optic communication cables. Two lower voltage lines belonging to MTEMC would be placed on the same structures beneath the lowest 161-kV conductor.

At river or highway crossings, such as the Harpeth and West Harpeth Rivers, double poles may be used in order to maintain adequate clearance between the conductors and whatever lies below them.

Poles at angles in the line may require supporting guys. Some structures for larger angles could require two or three poles. The poles and related steel hardware would be painted a color that appears as predominately black and is similar to the standard color used by the City of Franklin. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be back-filled with the excavated material. In some cases, gravel or a cement and gravel mixture might be used. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation which is formed and poured into an excavated hole.

Equipment used during the construction phase would include trucks, truck-mounted augers and drills, as well as tracked cranes and bulldozers.

2.2.1.2. Right-of-Way Acquisition and Clearing

New right-of-way would be needed for the transmission line. This right-of-way would normally be 100 feet wide with the exception of the section of the route alternatives parallel to the existing Mack Hatcher Parkway, which would have widths of 30 to 60 feet.

TVA would obtain easements from landowners for the new right-of-way. These easements would give TVA the right to construct, operate, and maintain the transmission line as well as remove danger trees off the right-of-way. Fee title for the land within the right-of-way would normally remain with the landowner, and a number of activities could be continued on the property by the landowner. The easement would prohibit certain activities including construction of buildings and any other activities within the right-of-way that could interfere with the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, most trees and shrubs would be initially removed from the entire width of the right-of-way. Equipment used during this right-of-way clearing includes chain saws, skidders, bulldozers, and/or feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the right-of-way to serve as sediment barriers. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential soon to grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote handling equipment, such as a feller-buncher, in order to limit ground disturbance. Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction and TVA Transmission Construction Guidelines Near Streams are included in Appendices IV, V, and VI.

Any trees located off the right-of-way which are tall enough to pass within 6 feet of a conductor or structure (if it were to fall toward the line) are designated “danger trees” and would be removed.

Subsequent to clearing and construction, the right-of-way would be restored as much as is possible to its state prior to construction consistent with right-of-way uses. Pasture areas would be reseeded with suitable grasses. Wooded areas would be restored using native grasses and other low-growing species. Erosion controls would remain in place until the plant communities were fully established.

2.2.1.3. Access Roads

Permanent access roads would be needed to allow vehicle access to each structure and other points along the right-of-way. TVA would obtain the necessary rights for these access roads from landowners. Existing roads including farm and field roads, some of which may need upgrading, would be used where possible. New access roads would be located on the right-of-way wherever possible and designed to avoid severe slope conditions and minimize stream crossings. New access roads would be about 20 feet wide and surfaced with dirt or gravel. Culverts and other drainage devices, fences, and gates would be

installed as necessary. New access roads would be planted with approved seed mixtures following construction. Additional applicable environmental quality protection specifications are listed in Appendices IV and V.

The actual locations of access roads cannot be identified until a preferred corridor and specific alignments have been chosen and individual structure locations are known. The locations of access roads would be closely coordinated with potentially affected landowners.

2.2.1.4. Construction Assembly Areas

One or more construction assembly areas would be required for worker assembly, vehicle parking, and material storage. These areas may be on existing substation property or leased from a private landowner for the duration of the construction period. These areas are typically 5 to 10 acres in size, relatively flat, previously cleared, and located adjacent to an existing paved road near the transmission line. Depending on site conditions, some minor grading and installation of drainage structures may be required. The areas would be graveled and fenced, and trailers used for material storage and office space would be parked on the areas. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of the fence and restoration would be at the discretion of the landowner.

2.2.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the right-of-way, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.2.2. Operation and Maintenance

2.2.2.1. Inspection

Periodic inspections of 161-kV transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections are conducted to locate damaged conductors, insulators, or structures, and to report any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance or routine vegetation management.

2.2.2.2. Vegetation Management

Management of vegetation along the right-of-way would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. For a 161-kV transmission line, National Electric Safety Code standards require a minimum clearance of 24 feet.

Management of vegetation along the right-of-way would consist of two different activities: felling of "danger trees" adjacent to the cleared right-of-way and control of vegetation within the cleared right-of-way.

Management of vegetation within the cleared right-of-way would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed for each transmission line segment based on the results of the periodic inspections described above. Given the land use in the area of this project, right-of-way maintenance is expected to be minimal. The two principal management techniques are mechanical mowing, using tractor-mounted rotary mowers, and herbicide application. Herbicides are applied normally in areas where heavy growth of woody vegetation is occurring on the right-of-way and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle mounted sprayers.

Any herbicides used would be applied in accordance with applicable state and Federal laws and regulations and the commitments listed in this document. Only herbicides registered with the United States Environmental Protection Agency (USEPA) would be used. Appendix VII contains a complete list of the herbicides and adjuvants (ingredients added to the herbicide solution to increase its effectiveness) currently used by TVA in right-of-way management. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

2.3. Project and Siting Alternatives

Once a preferred project alternative, Alternative 1, was identified, the process of siting the required transmission line began. The basic steps followed when determining a transmission line route are to:

- Define the study area
- Collect data to minimize potential impacts to cultural and natural features
- Develop general route options and potential routes
- Delimit one or more alternative transmission line routes within the option(s)
- Gather public input
- Incorporate public input into the final selection of the preferred transmission line route

2.3.1. Definition of Study Area

The first task in defining the study area was to identify the power sources that could supply the identified need. At the beginning of the siting process, the goal was to supply power to the MTEMC's planned Bingham Substation. As the siting process developed, it was determined by MTEMC and they informed TVA that it was highly likely in the long term that another new substation would be needed somewhere in the west Franklin area.

The study area was defined based on the location of potential practical routes between potential power sources and the new substation. For this study, the regional study area included portions of northern Williamson and southern Davidson Counties. Its boundary was the Fairview area to the west, the Davidson 500-kV Substation to the north, Franklin to the east, and the Maury-Radnor 500-kV Transmission Line to the south.

The towns of Franklin and Fairview are within the study area. Smaller population centers include Leipers Fork and Fernvale. The refined study area encompasses approximately 270 square miles or 172,800 acres (Figure 1-2).

Steep, forested hills and coves dominate the western portion of the study area. Backbone Ridge and Harpeth River are the dominant features. Other features include Tom Redford Ridge, Boxley Valley, Waddell Hollow, and Ropers Knob.

The Natchez Trace Parkway runs north to south in the study area. The Basin Springs Natural Area contributes to the protection of scenic views and serves as habitat for threatened and endangered species. The study area also includes numerous historic and archaeological sites, cemeteries, and churches. New State Highway 96, designated as a Heritage Road, serves as a major gateway to Franklin.

The western and northern portion of the study area is mainly forested, rugged terrain and valleys with scattered houses and small roadside businesses. The major population center in the western portion is Fairview. The southern portion of the study area includes the community of Leipers Fork. The area is a pastoral environment that includes numerous heritage roads. The eastern portion of the study area includes the suburban and exurban development associated with Nashville and Davidson County. The largest population center is the historic city of Franklin.

Major transportation routes in the study area include: U.S. Highway 431 (from Nashville south through Williamson County), State Highway 100 (from Fairview northeast to Nashville), State Highway 96 (from State Highway 100 east to Franklin), and State Highway 46/Old Hillsboro Road (from U.S. Highway 431 south through the study area).

The study area contains the following Exceptional Heritage Roads as designated by the Williamson County Heritage Foundation (shown in Figures 1-1, 1-2 and 1-3):

- Boyd Mill Pike
- Natchez Trace Parkway
- Old Natchez Trace

2.3.2. Collect Data

Geographic data, such as topography, land use, transportation, environmental features, cultural resources, near-term future development, and land conservation information were collected for the entire study area. Analysis of the data was aided by using a geographic information system (GIS). This system allowed the multitude of factors of the large study area to be examined simultaneously to develop and evaluate numerous options and scenarios to determine the route or routes that would best meet project objectives while appropriately accounting for critical (including environmentally sensitive) resources.

A 1:100,000 GIS database was developed and used for regional opportunity and constraint analysis, while a 1:24,000 database was developed for more complex computations, such as acreage of wetlands and percent slope. Sources included 1 inch = 500 feet aerial photography, county tax maps/property boundaries, United States Geological Survey digital line graphs, Digital Elevation Models, National Wetlands Inventory, and cultural resource data. Aerial photography was interpreted providing land use and land cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches

and, cemeteries. Data were analyzed both manually and with GIS. Manual calculations from aerial photographs, tax maps, and other sources included the number of road crossings, stream crossings, and property parcels.

2.3.3. Develop General Route Options and Potential Routes

From the information gathered during the systems studies and data development phases, four options were identified to connect the identified power sources to the Bingham Substation. The first option involved linking the Bingham Substation with the Davidson 500-kV Substation to the north (Option A). The second option involved linking the Bingham Substation to the Aspen Grove Substation or the Franklin Substation in the city of Franklin (Option B). The third option involved linking the Bingham Substation to the Maury-Radnor Transmission Line located in the southern portion of the study area (Option C). The fourth option involved linking the Bingham Substation to the Jingo Substation or to the Davidson-Centerville Transmission Line located in western Williamson County near Fairview (Option D).

Within each option (A, B, C, and D), a network of potential routes was developed. The potential routes illustrate numerous alternatives for constructing a transmission line from the power source to the planned Bingham Substation, avoiding wherever possible all critical features. Each potential route was comprised of individual segments that were analyzed and compared against each other. The best segments were identified to help eliminate some of the alternatives. Of the more than 100 route possibilities identified early in the process, Option A had the fewest with 2, followed by 17 in Option D, 34 in Option C, and more than 50 in Option B. Route possibilities were added or eliminated throughout the process as new information on critical resources was obtained to develop a reasonable range of right-of-way alternatives.

2.3.3.1. Details of Option A

Option A involved developing an alternative transmission route network from the Davidson 500-kV Substation in the southwest corner of Davidson County, following the Maury-Davidson 500-kV Transmission Line south approximately 9.1 miles to the future Bingham 161-kV Substation. Only one potential corridor was identified, since it would be preferable to parallel the existing line to minimize the need for new right-of-way. The width of the study area was approximately 2000 feet on either side of the Maury-Davidson 500-kV Transmission Line. Approximately 3 miles of the study area are in Davidson County, and the remainder is in Williamson County. The centerline of the 161-kV line would need to be a minimum of 100 feet from the 500-kV line, and the right-of-way would extend a minimum of 50 feet beyond the 161-kV line.

Starting near the Davidson Substation, the new line would go south along the west side of the existing lines. The route would cross under the Maury-Davidson line about one-half mile north of State Highway 99 and follow the east side of the line to the Bingham Substation. Population growth is occurring around the Davidson Substation. The remainder of this route does not include any large population centers and is primarily undeveloped. The area is mainly forested terrain with scattered residential housing. Mountainous areas include Egypt Hollow, Waddell Hollow, and Backbone Ridge. Natural features include Poplar Creek, Brown Creek, and Little East Fork. There are numerous historic and archaeological resources near this route.

After the initial evaluation, TVA decided to investigate the potential of a 161-kV underbuild on the existing 500-kV line. An underbuild would consist of replacing the existing transmission line structures with new structures that would support both the present 500-kV circuit and an additional 161-kV circuit underneath the 500-kV lines. TVA determined that this was a technically feasible option, although the necessity of outages on the existing line associated with construction would lengthen the construction process by at least 2 or 3 years and cost an additional $800,000. Option A routes would be over 9 miles long.

2.3.3.2. Details of Option B

Option B required developing an alternative network of routes between the Aspen Grove 161-kV Substation or the Franklin 161-kV Substation and the Bingham Substation site. The Aspen Grove Substation is located on Mack Hatcher Parkway, and the Franklin Substation is located on Eddy Lane. MTEMC indicated that a connection to Aspen Grove would be needed if a route was chosen that started at the Franklin Substation.

The potential routes would follow a portion of the Mack Hatcher Parkway, Del Rio Pike, and Boyd Mill Pike, and then cross the West Harpeth River and Old Hillsboro Road before reaching the Bingham Substation site. The path from the Franklin Substation is north along Eddy Lane and the CSX railroad, turning west crossing U.S. Highway 31 and joining the route along Mack Hatcher Parkway east of U.S. Highway 431. All Option B routes would be approximately 8 miles long.

Growth from Nashville extends southward including suburban and exurban development in the neighborhood of Franklin. It includes single and multi-family residential, industrial, and commercial land uses. Subdivisions such as Founders Pointe and Rebel Meadows are nearby. The western portion of the area related to this option, near the future Bingham Substation, is more agricultural and less densely populated. Natural features include the Harpeth River, the West Harpeth River, Spencer Creek, and Ropers Knob. There are numerous historic and archaeological resources near this option.

2.3.3.3. Details of Option C

Option C required developing an alternative network of routes between tap points along the Maury-Radnor 161-kV Transmission Line and the Bingham Substation site. Tap points were identified where the Maury-Radnor Transmission Line crosses U.S. Highway 31, Kitrell Road, and West Harpeth Road. From these tap points, several alternative paths were projected northwest toward the Bingham area. The routes within this study area would be approximately 7.5 miles long and cross Carters Creek Pike between Southall and Leipers Fork Church before reaching the Bingham Substation site. Some routes would follow the Maury-Davidson 500-kV Transmission Line north to the Bingham area. Cultural features in this area include Southall Road and Boyd Mill Road.

The area associated with Option C was predominantly pasture and farmland. Natural features include West Harpeth River, Murfrees Fork, Polk Creek, and Boxley Valley.

2.3.3.4. Details of Option D

Option D required developing an alternative network of routes between the Jingo Substation or from tap points along the Davidson-Centerville 161-kV Transmission Line and

the Bingham Substation site. These alternatives are located near the Fairview Community in Williamson County to the south and Davidson County in the northernmost portion of the study area. Route alternatives in this study area vary in length from approximately 12 miles for the Jingo Substation alternative to approximately 10 miles from tap line alternatives west of State Highway 100. All paths within this study area are southeast of the Fairview area and cross the Natchez Trace Parkway between the Leipers Fork exit and the State Highway 96 exit before ending at the Bingham Substation site.

The small community of Fernvale is located in the study area, and Fairview is the larger population center. Development is scattered throughout the study area and is primarily residential; a children's summer camp is also located in the area. Natural features include Backbone Ridge, Tom Redford Ridge, East Fork Creek, Bedford Creek, and Hunting Camp Creek. There are numerous historic and archaeological resources near this option.

2.3.4. Route Network Development

The main step in developing a route was to identify a network of feasible routes using the network of all possible routes above. Thirty-five route options were identified. Option A had two potential routes, Option B had 20 potential routes, Option C had six potential routes, and Option D had seven potential routes. (Numerous additional potential routes were identified, but many differed in only very minor aspects, and analysts discarded them to allow for a reasonable evaluation process.) Many of the Option B routes were adjusted as new information on critical resources was obtained.

2.3.5. Establish and Apply Siting Criteria

TVA has long employed a set of evaluation criteria that represent opportunities and constraints for development of transmission routes. The criteria are oriented toward factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and right-of-way acquisition cost being the most important elements. In addition, the scenic and historic resources in this study area required special consideration. Information gathered and comments made at public meetings were taken into account while refining criteria to be specific to the study area and special criteria were added related to the Natchez Trace Parkway, other historic roads, and Tennessee Century Farms.

Each of the routes was evaluated according to these criteria relating to engineering, environmental, land use, and cultural concerns. Specific criteria are described below; for each category described, a higher score means a bigger constraint. For example, a greater number of streams crossed, a longer route length, or a greater number of historic resources affected would give an alternative route a worse score.

Engineering Criteria

- Engineering criteria included total length of the transmission route, length of new right-of-way and rebuilt right-of-way, primary and secondary road crossings, pipeline and transmission line crossings, and total line cost.

Environmental Criteria

- Environmental criteria included slopes greater than 30 percent (steeper slopes mean more potential for erosion and potential water quality impacts), slopes between 20 and 30 percent, visual aesthetics, forested acres, open water crossings, sensitive stream

crossings, perennial and intermittent stream crossings, wetlands, rare species habitat, natural area crossings, and wildlife management areas.

Land Use Criteria

- Land use criteria included the number of fragmented property parcels, schools, houses, commercial or industrial buildings, barns, and parkland crossings.

Cultural Criteria

- Cultural criteria included archaeological and historic sites, churches and cemeteries, caves, Tennessee Century Farms, the Natchez Trace Parkway, and heritage roads.

Scores for each of the alternatives were calculated by adding individual criterion values for each route. The resulting sum values were evaluated using standard statistical techniques and were assigned a ranking from 1 to 4 for each route in each subcategory (engineering, environmental, land use, and cultural).

A weighted score was produced for each route in each subcategory. This made it possible to understand which routes would have the lowest and highest impacts on engineering, environmental, land use, and cultural resources. Finally, to determine total impacts, the scores from each category were combined for an overall score.

Option A-Siting Constraints

Option A routes had more impacts on natural areas than other options. These routes had a greater amount of steep slopes between 20 to 30 percent than other routes. Routes in Option A were the only routes within 100 feet of a cemetery. Like the other options, Option A routes had numerous historic sites located nearby that are listed on the National Register of Historic Places. Option A had fewer, but more significant constraints than any other option. The largest constraint associated with the A option was the crossing of the Natchez Trace Parkway. The largest constraint associated with the underbuild option was the required time for construction. For systems planning, Option A would have over 34 miles of transmission line without circuit breakers. This connected exposure increases the risk of service interruptions in the area.

Advantages included:

- Strong source of power
- Parallels or underbuilds an existing 500-kV line
- Conducive to long range plans

Option B-Siting Constraints

Siting constraints in this area included existing subdivisions and other residential, commercial, and institutional development including a school and church near Del Rio Pike. Other constraints included more primary road crossings and heritage road crossings. Option B affected more commercial development, historic sites (Tennessee Century Farms), and archeological sites than any other option.

Advantages included:

- Strong source of power
- Least amount of connected exposure (10 miles)
- Uses 1 mile of existing line
- Conducive to long-range plans (would serve future West Franklin Station as well as provides additional reliability to the Aspen Grove Substation/Cool Springs area)

Option C-Siting Constraints

Siting constraints in this area included visibility issues associated with several heritage roads including Boyd Mill Pike and Southall Road. The pastoral character of the valley as well as the poorer quality of the Maury-Radnor line as a power source made Option C less desirable. Other siting issues included steep slopes, minor stream crossings, numerous historic structures nearby, and fragmentation of forested acres. This option has over 37 miles of connected exposure.

Option D-Siting Constraints

Siting constraints in this area include visibility, effect on the rural community, and crossing of the Natchez Trace Parkway. Option D has the longest and most expensive routes with the steepest slopes of any option. It also has a higher number of minor stream crossings and is the only option that affects a natural area—Basin Springs. Option D did provide an adequate source of power, but the transmission line to be tapped is a low-capacity conductor. With over 36 miles of connected exposure and the weakest source of power, Option D did not meet the power and reliability needs as well as the other options.

2.3.6. Identify Preferred Option

Options C and D were eliminated as reasonable route options and were not subjected to more detailed analyses after the preliminary route screening analyses. Option C was more expensive, had over 37 miles of connected exposure, and did not fit into the long-range plans of the area. Because Option D triggered substantial negative public reaction and the fact that this option offered the weakest electrical solution to MTEMC's power supply needs, it was dropped from further consideration and evaluation fairly early in the process. Both options also had a number of adverse environmental impacts.

For Option A, one route ranked first among all of the routes. In Option B, many of the routes ranked highly compared with other route options. Although many of the B routes had negligible differences in overall impact, two had the least overall impact of all routes.

The final analysis showed that a variation of an Option A ranked first, while many of the B Option routes were ranked as top routes. The Option A route, however, had a significant constraint because of the approvals that would be needed from the National Park Service for an additional crossing of the Natchez Trace Parkway. Obtaining that approval, which is by no means certain, almost certainly would significantly delay the beginning of construction of the new line. TVA could not be certain that (a) the approval would be obtained or (b) it could be obtained in time to guarantee service to the new substation by 2004. The second Option A route, which involved rebuilding the existing 500-kV line with the 161-kV line strung under the 500-kV line on the same towers, would also be a lengthy process, delaying the in-service date. In addition, Route A would not help in serving the future loads

in the west Franklin area. These constraints lessened the ability of Route A options to meet project needs.

Because of these constraints, as well as the results of the preliminary analysis, which identified many of the top potential routes as Option B routes, TVA decided to investigate a route within Option B further. The decision was also made to focus on route options which began at the Aspen Grove Substation since a connection at Franklin would still require a connection to Aspen Grove and because of the development which significantly restricted any new line route leaving the Franklin Substation.

The subsequent investigation of Option B entailed detailed field reconnaissance and discussions with numerous individual property owners, as well as local elected officials, and public interest groups.

2.4. The Preferred Alternative

The route identified as having the best score among the Option B routes was chosen as the basis for development of a preferred route. This route and possible alternatives were identified based on additional meetings with the public, local, and state government officials, potentially affected landowners, and on-ground reconnaissance by TVA engineering and biological staffs. The original route projection and the alternates are described in the two following sections.

Right-of-way width for the preferred route would be 100 feet wide except as follows: The first section of the preferred route, would have the transmission line right-of-way centerline parallel to and 10 feet north of the Mack Hatcher Parkway right-of-way for approximately 4200 feet, resulting in the purchase of a new right-of-way width of 60 feet. The next section of approximately 2700 feet would have the centerline immediately south of the service road along Mack Hatcher Parkway resulting in the need to purchase a new right-of-way width of 30 feet, north of the service road. The last portion of this section would be about 4200 feet long and would have the centerline immediately adjacent to the north edge of Mack Hatcher Parkway, resulting in the need to purchase a new right-of-way width of 50 feet north of the Parkway.

2.4.1. Aspen Grove to U.S. Highway 431

Two alternate routes were identified with similar scores between the Aspen Grove Substation and U.S. Highway 431. One was approximately parallel to Mack Hatcher Parkway on the north, and the second was approximately parallel to Mack Hatcher Parkway on the south. The northern alternative offered the advantage of allowing the transmission line right-of-way to overlap with the road right-of-way, thus reducing the total acreage of new land to be encumbered when compared to the southern route. From an engineering standpoint, the use of the southern route was problematic. The curve of the road would require that the transmission line structures have guy wires extending toward, rather than away from, the roadbed. This would require a wider right-of-way between the structures and the road right-of-way. The southern route would also have been somewhat closer to Roper's Knob, an historic resource. Field observations did not indicate any appreciable differences in the potential for environmental effects between the two routes. Land use aspects of the two routes were also very similar.

Based on these considerations the alternative along the north side of Mack Hatcher Parkway was selected as the preferred alternative for this portion of the route.

2.4.2. U.S. Highway 431 to Bingham

The route segment combination, which was originally identified as having the best score among the Option B routes, is shown as a green dashed line on Figure 1-3. This route moves almost due west from the Highway 431 interchange, across Baugh Bend of the Harpeth River, turns due south about 1000 feet west of the second river crossing, avoids an identified historic structure, and turns due west again. The route then continues west for about 6000 feet and turns back to the north along a property line and then back west. This route section would roughly parallel the southern route alternative shown by the Tennessee Department of Transportation (TDOT) for the proposed extension of Mack Hatcher Parkway. This turn north allowed the route to avoid two additional historic properties, but forced a crossing of a bend of the West Harpeth River. The route then moved south and west on to the Bingham site, crossing the West Harpeth three more times and passing between two more identified historic structures.

Based on additional analysis of available data and comments from landowners and other interested parties, alternative segments were identified in the vicinity of the base route as possible modifications to that route.

Alternative Route Segment A is shown as a dashed purple line on Figure 1-3. This alternative would cross U.S. Highway 431 immediately north of the Rebel Meadows Subdivision and then turn south, avoiding a crossing of the Harpeth River. The route would then go around the end of Baugh Bend and turn back to run generally west before intersecting the original route projection.

Alternative Route Segment B is shown as a black line on Figure 1-3. This alternative follows the original route until a point about 1000 feet west of the second crossing of the Harpeth River. At this point Alternative B, would continue west approximately following a northern route alternative shown by TDOT for the proposed extension of Mack Hatcher Parkway for about 1 mile, and then continue on to intersect the original route at a point immediately east of the West Harpeth River.

Alternative Route Segment C is shown as a dashed red line on Figure 1-3. This alternative follows the original route until a point about 4000 feet east of the Harpeth River, where it would leave this projection and continue almost due west for about 2000 feet, and then turn south to a point immediately north of Tennessee Highway 96. It would then cross Highway 96 and Boyd Mill Pike and run west parallel to Boyd Mill Pike on the south side for about 3000 feet, cross 96 and run parallel for about 4000 feet, angle around a bend of the West Harpeth, and then rejoin the original projection.

2.4.3. Preferred Route Selection

The original route, labeled as the main corridor and shown as a dashed green line in Figure 1-3, and the identified alternatives were analyzed using the numerical criteria discussed above. Field studies were carried out, and extensive contacts were made with potentially affected landowners and with other interested parties.

The original route offered minimal impact to historic resources and, in fact, passed within 1000 feet of only two structures. This route also avoided most of the developed residential areas present within the portion of the study area west of Highway 431.

Alternative Route Segment A avoided two river crossings. However, it would be located in very close proximity to two identified historic structures. Also, it was determined that, if the Mack Hatcher Parkway extension followed its announced southern route, there would be difficulty in placing the new transmission line in the area remaining between the Mack Hatcher Parkway extension and the river. In that event, use of this alternative would result in the removal of most of the riparian trees on the east bank of the Harpeth River on Baugh Bend with associated environmental impacts.

Alternative Route Segment B was located north of the original route and offered the advantage over that route of being further from a listed historic structure. This alternative route segment also offered the advantage of being outside the viewshed of this structure and Del Rio Pike.

Alternative Route Segment C offered the advantage of eliminating four crossings of the West Harpeth River. This route would have resulted in a location parallel and adjacent to Boyd Mill Pike for a distance of approximately 6000 feet. Boyd Mill Pike has been designated as a Heritage Road by the Heritage Foundation of Franklin and Williamson County and has been deemed eligible by the Tennessee Historic Preservation Officer for listing in the National Register of Historic Places.

All of the route segments were marked on the ground by survey teams and walked by resource specialists. These resource teams were made up of individuals with expertise in wetland and aquatic ecology, historic and archaeological resources, wildlife, botany, and visual aesthetics. These routes were shown to the public at the September 21, 2000, meeting. After a full evaluation, a preferred route was selected which utilized the original projection modified by use of Alternative Route Segment B (Figure 1-3). To the maximum extent possible, this route avoids impacts to historic resources, could be built without materially impacting aquatic resources, and appears to best balance the various landowner interests in the area as determined by TVA’s contacts with landowners.